Mollusc diseases: new categories of host species

In the *Aquatic Animal Health Code* (AAHC) and the *Diagnostic Manual for Aquatic Animal Diseases* (the *Manual*) susceptible species for *Perkinsus olseni/atlanticus* are: *Haliotis ruber, H. cyclobates, H. scalaris, H. laevigata, Ruditapes philippinarum* and *R. decussatus*, although current evidence suggests that *P. olseni/atlanticus* can cause mortality in species other than those listed. While Ray's fluid thioglycollate medium (RFTM) culture technique is more reliable than histology for detecting infection, it gives no information on whether the host is simply a carrier of the infection, or whether it is diseased. Using histology instead of RFTM, *P. olseni* was found to cause disease in other species including pearl oysters (2, 3). Currently, it appears that many families and species of molluscs may carry schizonts of the parasite that, in some individuals and for unknown reasons, become activated, culminating in systemic disease. Most hosts are probably susceptible to infection under certain circumstances. Therefore to name, in the AAHC, only a few species as being susceptible to disease may be misleading and the following change of the wording to Article 3.1.5.1. is proposed:

> "… susceptible host species for *Perkinsus olseni/atlanticus* are abalones and clam species, among which clinical signs and disease are observed only in *Haliotis ruber, H. cyclobates, H. scalaris and H. laevigata, Ruditapes philippinarum* and *R. decussatus*. Many other species may become diseased under certain circumstances."

However, in the case of *Perkinsus olseni/atlanticus* more than 50 mollusc species would have to be listed as carriers, which is neither practicable nor fully exhaustive. Changing Articles 3.1.5.6. and 3.1.5.8. by deleting the reference to "perkinsosis susceptible host species" could resolve the situation. This would emphasise the potential role of molluscs species as vectors and carriers.

From a more general point of view, it is proposed to modify Articles 3.1.X.6. and 3.1.X.8. in a similar way for the same reasons in all the mollusc disease chapters in the AAHC.

It has also been established that *Haplosporidium nelsoni* infects, but does not cause disease in, *Crassostrea gigas* (1, 4), whereas it causes serious disease in *C. virginica*. The FDC discussed two consequences of this situation, which are 1: the difference in risks associated with movements and transfers of the two susceptible host species, and 2: the difference in surveillance programmes that may be implemented when clinical disease may be absent and prevalence of infection is extremely low. Taking into account this situation, the Commission proposes the following change of wording to Article 3.1.2.1.:

> "… susceptible host species for *Haplosporidium nelsoni* are: *Crassostrea virginica* and *C. gigas*, among which clinical signs and disease are observed only in *Crassostrea virginica*".

1. FRIEDMAN C.S., CLONEY D.F., MANZER D. & HEDRICK R.P. (1991). Haplosporidiosis of the Pacific oyster, *Crassostrea gigas*. *J. Invertebr. Pathol.*, **58**, 367–372.

2. HINE P.M. & THORNE T. (2000). A survey of some parasites and diseases of several species of bivalve mollusc in northern Western Australia. *Dis. Aquat. Org.*, **40**, 67–78.

3. NORTON J.H., SHEPHERD M.A., PERKINS F.P. & PRIOR H.C. (1993). Perkinsus-like infection in farmed golden-lipped pearl oyster *Pinctada maxima* from the Torres Strait, Australia. *J. Invertebr. Pathol.*, **62**, 105–106.

4. RENAULT T., STOKES N.A., CHOLLET B., COCHENNEC N., BERTHE F., GERARD A. & BURRESON E.M. (2000). Haplosporidiosis in the Pacific oyster *Crassostrea gigas* from the French Atlantic coast. *Dis. Aquat. Org.*, **42**, 207–214.

Appendix X

SECTION 3.1.

DISEASES NOTIFIABLE TO THE OIE

CHAPTER 3.1.1.

[BONAMIOSIS] HAEMOCYTOSIS OF FLAT OYSTERS (*Bonamia ostreae* [*B. exitiosus, Mikrocytos roughleyi*])

Article 3.1.1.1.

The present chapter refers only to [bonamiosis] haemocytosis of flat oysters when caused by [the *disease agents* listed below as the susceptible host species indicated for each pathogen] *Bonamia ostreae*.

For the purposes of this *Code*, susceptible host species for *Bonamia ostreae* are probably all *Ostrea* species including: *Ostrea edulis, O. angasi, O. denselammellosa, O. puelchana, Ostreola conchaphila* (= *O. lurida*) and *O.* [*Tiostrea*] *chilensis* (= *Tiostrea lutaria*), in which clinical signs and disease have been reported [susceptible host species for *Bonamia exitiosus* are: *Tiostrea chilensis* and *Ostrea angasi,* and the susceptible host species for *Mikrocytos roughleyi* is: *Saccostrea commercialis*].

Standards for diagnostic tests are described in the *Manual*.

Article 3.1.1.2.

[Bonamiosis] Haemocytosis of flat oysters free country

A country may be considered free from [bonamiosis] haemocytosis of flat oysters when:

1. no *outbreak* caused by [the *disease agents* listed in Article 3.1.1.1] *Bonamia ostreae* has occurred within its *territory* for at least the previous two years;

2. no [*disease agent* listed in Article 3.1.1.1] *Bonamia ostreae* has been detected in any *mollusc* tested during operation of an official mollusc health *surveillance* scheme for a period of at least two years using the procedures described in the *Manual*.

Article 3.1.1.3.

[Bonamiosis] Haemocytosis of flat oysters free zone

A zone may be considered free from [bonamiosis] haemocytosis of flat oysters when:

1. no *outbreak* caused by [the *disease agents* listed in Article 3.1.1.1] *Bonamia ostreae* has occurred within its *territory* for at least the previous two years;

2. no [*disease agent* listed in Article 3.1.1.1] *Bonamia ostreae* has been detected in any *mollusc* tested during operation of an official mollusc health *surveillance* scheme for a period of at least two years using the procedures described in the *Manual* (where a zone common to several countries is involved, these countries should implement harmonised and co-ordinated national disease *surveillance* programmes).

Article 3.1.1.4.

[Bonamiosis] Haemocytosis of flat oysters aquaculture establishment

A [bonamiosis] haemocytosis of flat oysters free *aquaculture establishment* may be located within a [bonamiosis] haemocytosis of flat oysters free country or zone or within a [bonamiosis] haemocytosis of flat oysters infected zone provided that:

1. it has been tested in an official mollusc health *surveillance* scheme for at least the previous two years using the procedures described in the *Manual*, without detection of [any of the *disease agents* listed in Article 3.1.1.1] *Bonamia ostreae*, and

2. it is supplied with water by a means that ensures removal or destruction of any [of the *disease agents* listed in Article 3.1.1.1] *Bonamia ostreae* that may be present.

Article 3.1.1.5.

Restoration of free status

A country, a zone or an *aquaculture establishment* may be restored to [bonamiosis] haemocytosis of flat oysters free status if no [*disease agent* listed in Article 3.1.1.1] *Bonamia ostreae* has been detected for the last two years of a *surveillance* scheme using the procedures described in the *Manual*.

Article 3.1.1.6.

When importing live *molluscs* of all age groups [of any susceptible host species] for re-immersion, the *Competent Authority* of the *importing country* should require that the consignment be accompanied by an *international aquatic animal health certificate* issued by the *Competent Authority* of the *exporting country* or a *certifying official* approved by the *importing country*.

This certificate must certify, on the basis of an official mollusc health *surveillance* scheme comprising inspection and laboratory tests on susceptible host species conducted according to the procedures described in the *Manual*, whether or not the place of harvest of the consignment is a country officially declared [bonamiosis] haemocytosis of flat oysters free.

If the place of harvest of the consignment is not a country officially declared [bonamiosis] haemocytosis of flat oysters free, the certificate must state whether the place of harvest of the consignment is:

1. a zone officially declared [bonamiosis] haemocytosis of flat oysters free, or

2. an *aquaculture establishment* officially declared [bonamiosis] haemocytosis of flat oysters free.

The certificate shall be in accordance with Model Certificate No. 3 given in Part 6 of this *Code*.

[Article 3.1.1.7.

Importing countries that are officially declared bonamiosis free should only accept for importation live *molluscs* from *exporting countries* declared bonamiosis free, or from clearly defined bonamiosis free zones in countries not declared bonamiosis free.

Importing countries not regarded as bonamiosis free, but that have officially recognised bonamiosis free zones, should only import *molluscs* into such zones from other countries or zones that are officially declared bonamiosis free.

For *aquaculture establishments* officially declared bonamiosis free that exist in infected zones, the *Competent Authority* of the country concerned should only allow importation of *molluscs* from officially declared bonamiosis free countries, zones or *aquaculture establishments*.]

Article 3.1.1.7.

Competent Authorities of *importing countries* should require:

for *molluscs* of commercial size destined for human consumption

the presentation of an *international aquatic animal health certificate* attesting that the *molluscs* [listed as bonamiosis susceptible host species] have as their place of harvest a country, a zone or an *aquaculture establishment* free from [bonamiosis] haemocytosis of flat oysters.

The certificate shall be in accordance with Model Certificate No. 3.

This certificate may not be required for *molluscs* [listed as susceptible host species] originating from an infected zone if they are destined:

1. directly for human consumption without any re-immersion, or

2. for storage, during a short period before consumption, in a tank located in an infected zone. The tank should be isolated from the local environment (e.g. in quarantine) to avoid the potential introduction of different strains of the pathogen.

Article 3.1.1.8.

[Certificates are optional for *molluscs* not listed as natural or experimental bonamiosis susceptible host species] This certificate may not be required for mollusc species that have been demonstrated not to be vectors of *Bonamia ostrea*, even if the *molluscs* originate from an infected country, zone or *aquaculture establishment*.

CHAPTER 3.1.2.

[BONAMIOSIS] HAEMOCYTOSIS OF DREDGE OYSTERS (*Bonamia exitiosus* [*B. ostreae, Mikrocytos roughleyi*])

Article 3.1.2.1.

The present chapter refers only to [bonamiosis] haemocytosis of dredge oysters when caused by [the *disease agents* listed below as the susceptible host species indicated for each pathogen] *Bonamia exitiosus*.

For the purposes of this *Code*, susceptible host species for *Bonamia exitiosus* are probably all *Ostrea* species including: *Ostrea* [*Tiostrea*] *chilensis* (*= Tiostrea lutaria*) and *Ostrea angasi*, in which clinical signs and disease have been reported [susceptible host species for *Bonamia ostrea* are: *Ostrea edulis, O. angasi, O. denselammello sa, O. puelchana, Ostreola conchaphila* (= *O. lurida*) and *Tiostre* a *chilensis* (= *T. lutaria*) and the susceptible host species for *Mikrocytos roughleyi* is: *Saccostrea commercialis*].

Standards for diagnostic tests are described in the *Manual*.

Article 3.1.2.2.

[Bonamiosis] Haemocytosis of dredge oysters free country

A country may be considered free from [bonamiosis] haemocytosis of dredge oysters when:

1. no *outbreak* caused by [the *disease agents* listed in Article 3.1.2.1] *Bonamia exitiosus* has occurred within its *territory* for at least the previous two years;

2. no [*disease agent* listed in Article 3.1.2.1] *Bonamia exitiosus* has been detected in any *mollusc* tested during operation of an official mollusc health *surveillance* scheme for a period of at least two years using the procedures described in the *Manual*.

Article 3.1.2.3.

[Bonamiosis] Haemocytosis of dredge oysters free zone

A zone may be considered free from [bonamiosis] haemocytosis of dredge oysters when:

1. no *outbreak* caused by [the *disease agents* listed in Article 3.1.2.1] *Bonamia exitiosus* has occurred within its *territory* for at least the previous two years;

2. no [*disease agent* listed in Article 3.1.2.1] *Bonamia exitiosus* has been detected in any *mollusc* tested during operation of an official mollusc health *surveillance* scheme for a period of at least two years using the procedures described in the *Manual* (where a zone common to several countries is involved, these countries should implement harmonised and co-ordinated national disease *surveillance* programmes).

Article 3.1.2.4.

[Bonamiosis] Haemocytosis of dredge oysters aquaculture establishment

A [bonamiosis] haemocytosis of dredge oysters free *aquaculture establishment* may be located within a [bonamiosis] haemocytosis of dredge oysters free country or zone or within a [bonamiosis] haemocytosis of dredge oysters infected zone provided that:

1. it has been tested in an official mollusc health *surveillance* scheme for at least the previous two years using the procedures described in the *Manual*, without detection of [any of the *disease agents* listed in Article 3.1.2.1] *Bonamia exitiosus*, and

2. it is supplied with water by a means that ensures removal or destruction of any [of the *disease agents* listed in Article 3.1.2.1] *Bonamia exitiosus* that may be present.

Article 3.1.2.5.

Restoration of free status

A country, a zone or an *aquaculture establishment* may be restored to [bonamiosis] haemocytosis of dredge oysters free status if no [*disease agent* listed in Article 3.1.2.1] *Bonamia exitiosus* has been detected for the last two years of a *surveillance* scheme using the procedures described in the *Manual*.

Article 3.1.2.6.

When importing live *molluscs* of all age groups [of any susceptible host species] for re-immersion, the *Competent Authority* of the *importing country* should require that the consignment be accompanied by an *international aquatic animal health certificate* issued by the *Competent Authority* of the *exporting country* or a *certifying official* approved by the *importing country*.

This certificate must certify, on the basis of an official mollusc health *surveillance* scheme comprising inspection and laboratory tests on susceptible host species conducted according to the procedures described in the *Manual*, whether or not the place of harvest of the consignment is a country officially declared [bonamiosis] haemocytosis of dredge oysters free.

If the place of harvest of the consignment is not a country officially declared [bonamiosis] haemocytosis of dredge oysters free, the certificate must state whether the place of harvest of the consignment is:

1. a zone officially declared [bonamiosis] haemocytosis of dredge oysters free, or

2. an *aquaculture establishment* officially declared [bonamiosis] haemocytosis of dredge oysters free.

The certificate shall be in accordance with Model Certificate No. 3 given in Part 6 of this *Code*.

[Article 3.1.2.7.

Importing countries that are officially declared bonamiosis free should only accept for importation live *molluscs* from *exporting countries* declared bonamiosis free, or from clearly defined bonamiosis free zones in countries not declared bonamiosis free.

Importing countries not regarded as bonamiosis free, but that have officially recognised bonamiosis free zones, should only import *molluscs* into such zones from other countries or zones that are officially declared bonamiosis free.

For *aquaculture establishments* officially declared bonamiosis free that exist in infected zones, the *Competent Authority* of the country concerned should only allow importation of *molluscs* from officially declared bonamiosis free countries, zones or *aquaculture establishments*.]

Article 3.1.2.7.

Competent Authorities of *importing countries* should require:

for *molluscs* of commercial size destined for human consumption

the presentation of an *international aquatic animal health certificate* attesting that the *molluscs* [listed as bonamiosis susceptible host species] have as their place of harvest a country, a zone or an *aquaculture establishment* free from [bonamiosis] haemocytosis of dredge oysters.

The certificate shall be in accordance with Model Certificate No. 3.

This certificate may not be required for *molluscs* [listed as susceptible host species] originating from an infected zone if they are destined:

1. directly for human consumption without any re-immersion, or

2. for storage, during a short period before consumption, in a tank located in an infected zone. The tank should be isolated from the local environment (e.g. in quarantine) to avoid the potential introduction of different strains of the pathogen.

Article 3.1.2.8.

[Certificates are optional for *molluscs* not listed as natural or experimental bonamiosis susceptible host species] This certificate may not be required for mollusc species that have been demonstrated not to be vectors of *Bonamia exitiosus*, even if the *molluscs* originate from an infected country, zone or *aquaculture establishment*.

CHAPTER 3.1.3.

[BONAMIOSIS] WINTER MORTALITY (*Mikrocytos roughleyi* [*Bonamia ostreae, B. exitiosus*])

Article 3.1.3.1.

The present chapter refers only to [bonamiosis] winter mortality when caused by [the *disease agents* listed below as the susceptible host species indicated for each pathogen] *Mikrocytos roughleyi*.

For the purposes of this *Code*, susceptible host species for *Mikrocytos roughleyi* is: *Saccostrea commercialis* (= *S. glomerata*) [susceptible host species for *Bonamia exitiosus* are: *Tiostrea chilensis* and *Ostrea angasi*, susceptible host species for *Bonamia ostreae* are *Ostrea edulis, O. angasi, O. denselammellosa, O. puelchana, Ostreola conchaphila* (= *O. luri da*) and *Tiostrea chilensis* (= *T. lutaria*)].

Standards for diagnostic tests are described in the *Manual*.

Article 3.1.3.2.

[Bonamiosis] Winter mortality free country

A country may be considered free from [bonamiosis] winter mortality when:

1. no *outbreak* caused by [the *disease agents* listed in Article 3.1.3.1] *Mikrocytos roughleyi* has occurred within its *territory* for at least the previous two years;

2. no [*disease agent* listed in Article 3.1.3.1] *Mikrocytos roughleyi* has been detected in any *mollusc* tested during operation of an official mollusc health *surveillance* scheme for a period of at least two years using the procedures described in the *Manual*.

Article 3.1.3.3.

[Bonamiosis] Winter mortality free zone

A zone may be considered free from [bonamiosis] winter mortality when:

1. no *outbreak* caused by [the *disease agents* listed in Article 3.1.3.1] *Mikrocytos roughleyi* has occurred within its *territory* for at least the previous two years;

2. no [*disease agent* listed in Article 3.1.3.1] *Mikrocytos roughleyi* has been detected in any *mollusc* tested during operation of an official mollusc health *surveillance* scheme for a period of at least two years using the procedures described in the *Manual* (where a zone common to several countries is involved, these countries should implement harmonised and co-ordinated national disease *surveillance* programmes).

Article 3.1.3.4.

[Bonamiosis] Winter mortality aquaculture establishment

A [bonamiosis] winter mortality free *aquaculture establishment* may be located within a [bonamiosis] winter mortality free country or zone or within a [bonamiosis] winter mortality infected zone provided that:

1. it has been tested in an official mollusc health *surveillance* scheme for at least the previous two years using the procedures described in the *Manual*, without detection of [any of the *disease agents* listed in Article 3.1.3.1] *Mikrocytos roughleyi*, and

2. it is supplied with water by a means that ensures removal or destruction of any [of the *disease agents* listed in Article 3.1.3.1] *Mikrocytos roughleyi* that may be present.

Article 3.1.3.5.

Restoration of free status

A country, a zone or an *aquaculture establishment* may be restored to [bonamiosis] winter mortality free status if no [*disease agent* listed in Article 3.1.3.1] *Mikrocytos roughleyi* has been detected for the last two years of a *surveillance* scheme using the procedures described in the *Manual.*

Article 3.1.3.6.

When importing live *molluscs* of all age groups [of any susceptible host species] for re-immersion, the *Competent Authority* of the *importing country* should require that the consignment be accompanied by an *international aquatic animal health certificate* issued by the *Competent Authority* of the *exporting country* or a *certifying official* approved by the *importing country.*

This certificate must certify, on the basis of an official mollusc health *surveillance* scheme comprising inspection and laboratory tests on susceptible host species conducted according to the procedures described in the *Manual,* whether or not the place of harvest of the consignment is a country officially declared [bonamiosis] winter mortality free.

If the place of harvest of the consignment is not a country officially declared [bonamiosis] winter mortality free, the certificate must state whether the place of harvest of the consignment is:

1. a zone officially declared [bonamiosis] winter mortality free, or

2. an *aquaculture establishment* officially declared [bonamiosis] winter mortality free.

The certificate shall be in accordance with Model Certificate No. 3 given in Part 6 of this *Code.*

[Article 3.1.3.7.

Importing countries that are officially declared bonamiosis free should only accept for importation live *molluscs* from *exporting countries* declared bonamiosis free, or from clearly defined bonamiosis free zones in countries not declared bonamiosis free.

Importing countries not regarded as bonamiosis free, but that have officially recognised bonamiosis free zones, should only import *molluscs* into such zones from other countries or zones that are officially declared bonamiosis free.

For *aquaculture establishments* officially declared bonamiosis free that exist in infected zones, the *Competent Authority* of the country concerned should only allow importation of *molluscs* from officially declared bonamiosis free countries, zones or *aquaculture establishments*.]

Article 3.1.3.7.

Competent Authorities of *importing countries* should require:

for *molluscs* of commercial size destined for human consumption

the presentation of an *international aquatic animal health certificate* attesting that the *molluscs* [listed as bonamiosis susceptible host species] have as their place of harvest a country, a zone or an *aquaculture establishment* free from [bonamiosis] winter mortality.

The certificate shall be in accordance with Model Certificate No. 3.

This certificate may not be required for *molluscs* [listed as susceptible host species] originating from an infected zone if they are destined:

1. directly for human consumption without any re-immersion, or

2. for storage, during a short period before consumption, in a tank located in an infected zone. The tank should be isolated from the local environment (e.g. in quarantine) to avoid the potential introduction of different strains of the pathogen.

Article 3.1.3.8.

[Certificates are optional for *molluscs* not listed as natural or experimental bonamiosis susceptible host species] This certificate may not be required for mollusc species that have been demonstrated not to be vectors of *Mikrocytos roughleyi*, even if the *molluscs* originate from an infected country, zone or *aquaculture establishment.*

CHAPTER 3.1.4.

MSX DISEASE
(*Haplosporidium nelsoni*)

Article 3.1.4.1.

The present chapter refers only to MSX disease when caused by *Haplosporidium nelsoni*.

For the purposes of this *Code*, susceptible host species for *Haplosporidium nelsoni* are: *Crassostrea virginica* and *C. gigas*, among which clinical signs and disease are observed only in *C. virginica*.

Standards for diagnostic tests are described in the *Manual*.

Article 3.1.4.2.

MSX disease free country

A country may be considered free from MSX disease when:

1. no *outbreak* caused by *Haplosporidium nelsoni* has occurred within its *territory* for at least the previous two years;

2. no *Haplosporidium nelsoni* has been detected in any *mollusc* tested during operation of an official mollusc health *surveillance* scheme for a period of at least two years using the procedures described in the *Manual*.

Article 3.1.4.3.

MSX disease free zone

A zone may be considered free from MSX disease when:

1. no *outbreak* caused by *Haplosporidium nelsoni* has occurred within its territory for at least the previous two years;

2. no *Haplosporidium nelsoni* has been detected in any *mollusc* tested during operation of an official mollusc health *surveillance* scheme for a period of at least two years using the procedures described in the *Manual* (where a zone common to several countries is involved, these countries should implement harmonised and co-ordinated national disease *surveillance* programmes).

Article 3.1.4.4.

MSX disease free aquaculture establishment

an MSX disease free *aquaculture establishment* may be located within an MSX disease free country or zone or within an MSX disease infected zone provided that:

1. it has been tested in an official mollusc health *surveillance* scheme for at least the previous two years using the procedures described in the *Manual,* without detection of *Haplosporidium nelsoni*, and

2. it is supplied with water by a means that ensures removal or destruction of any *Haplosporidium nelsoni* that may be present.

Article 3.1.4.5.

Restoration of free status

A country, a zone or an *aquaculture establishment* may be restored to MSX disease free status if no *Haplosporidium nelsoni* has been detected for the last two years of a *surveillance* scheme using the procedures described in the *Manual.*

Article 3.1.4.6.

When importing live *molluscs* of all age groups [of any susceptible host species] for re-immersion, the *Competent Authority* of the *importing country* should require that the consignment be accompanied by an *international aquatic animal health certificate* issued by the *Competent Authority* of the *exporting country* or a *certifying official* approved by the *importing country.*

This certificate must certify, on the basis of an official mollusc health *surveillance* scheme comprising inspection and laboratory tests on susceptible host species conducted according to the procedures described in the *Manual,* whether or not the place of harvest of the consignment is a country officially declared MSX disease free.

If the place of harvest of the consignment is not a country officially declared MSX disease free, the certificate must state whether the place of harvest of the consignment is:

1. a zone officially declared MSX disease free, or

2. an *aquaculture establishment* officially declared MSX disease free.

The certificate shall be in accordance with Model Certificate No. 3 given in Part 6 of this *Code.*

[Article 3.1.2.7.

Importing countries that are officially declared MSX disease free should only accept for importation live *molluscs* from *exporting countries* declared MSX disease free, or from clearly defined MSX disease free zones in countries not declared MSX disease free.

Importing countries not regarded as MSX disease free, but that have officially recognised MSX disease free zones, should only import *molluscs* into such zones from other countries or zones that are officially declared MSX disease free.

For *aquaculture establishments* officially declared MSX disease free that exist in infected zones, the *Competent Authority* of the country concerned should only allow importation of *molluscs* from officially declared MSX disease free countries, zones or *aquaculture establishments*.]

Article 3.1.4.7.

Competent Authorities of *importing countries* should require:

for *molluscs* of commercial size destined for human consumption

the presentation of an *international aquatic animal health certificate* attesting that the *molluscs* [listed as MSX disease susceptible host species] have as their place of harvest a country, a zone or an *aquaculture establishment* free from MSX disease.

The certificate shall be in accordance with Model Certificate No. 3.

This certificate may not be required for *molluscs* [listed as susceptible host species] originating from an infected zone if they are destined:

1. directly for human consumption without any re-immersion, or

2. for storage, during a short period before consumption, in a tank located in an infected zone. The tank should be isolated from the local environment (e.g. in quarantine) to avoid the potential introduction of different strains of the pathogen.

Article 3.1.4.8.

[Certificates are optional for *molluscs* not listed as natural or experimental MSX disease susceptible host species] This certificate may not be required for mollusc species that have been demonstrated not to be vectors of *Haplosporidium nelsoni*, even if the *molluscs* originate from an infected country, zone or *aquaculture establishment.*

CHAPTER 3.1.8.

DERMO INFECTION [PERKINSOSIS] (*Perkinsus marinus*)

Article 3.1.8.1.

The present chapter refers only to [perkinsosis] Dermo infection when caused by [the *disease agents* listed below in the susceptible host species indicated for each pathogen] *Perkinsus marinus*.

For the purposes of this *Code*, susceptible host species for *Perkinsus marinus* are: *Crassostrea virginica* and *C. gigas*, among which clinical signs and disease are mainly observed in *C. virginica*. [and susceptible host species for *Perkinsus olseni/atlanticus* are: *Haliotis ruber, H. cyclobates, H. scalaris, H. laevigata, Ruditapes philippinarum* and *R. decussatus*.]

[Some 50 other species of *molluscs* may harbour *Perkinsus* species that are apparently non-pathogenic.]

Standards for diagnostic tests are described in the *Manual*.

Article 3.1.8.2.

[Perkinsosis] Dermo infection free country

A country may be considered free from [perkinsosis] Dermo infection when:

1. no *outbreak* caused by [the *disease agents* listed in Article 3.1.8.1] *Perkinsus marinus* has occurred within its *territory* for at least the previous two years;

2. no [*disease agent* listed in Article 3.1.8.1] *Perkinsus marinus* has been detected in any *mollusc* tested during operation of an official mollusc health *surveillance* scheme for a period of at least two years using the procedures described in the *Manual*.

Article 3.1.8.3.

[Perkinsosis] Dermo infection free zone

A zone may be considered free from [perkinsosis] Dermo infection when:

1. no *outbreak* caused by [the *disease agents* listed in Article 3.1.8.1] *Perkinsus marinus* has occurred within its territory for at least the previous two years;

2. no [*disease agent* listed in Article 3.1.8.1] *Perkinsus marinus* has been detected in any *mollusc* tested during operation of an official mollusc health *surveillance* scheme for a period of at least two years using the procedures described in the *Manual* (where a zone common to several countries is involved, these countries should implement harmonised and co-ordinated national disease *surveillance* programmes).

Article 3.1.8.4.

[Perkinsosis] Dermo infection free aquaculture establishment

A [perkinsosis] Dermo infection free *aquaculture establishment* may be located within a [perkinsosis] Dermo infection free country or zone or within a [perkinsosis] Dermo infection infected zone provided that:

1. it has been tested in an official mollusc health *surveillance* scheme for at least the previous two years using the procedures described in the *Manual,* without detection of [any of the *disease agents* listed in Article 3.1.8.1 *Perkinsus marinus*], and

2. it is supplied with water by a means that ensures removal or destruction of any [of the *disease agents* listed in Article 3.1.8.1] *Perkinsus marinus* that may be present.

Article 3.1.8.5.

Restoration of free status

A country, a zone or an *aquaculture establishment* may be restored to [perkinsosis] Dermo infection free status if no [*disease agent* listed in Article 31.8.1] *Perkinsus marinus* has been detected for the last two years of a *surveillance* scheme using the procedures described in the *Manual.*

Article 3.1.8.6.

When importing live *molluscs* of all age groups [of any susceptible host species] for re-immersion, the *Competent Authority* of the *importing country* should require that the consignment be accompanied by an *international aquatic animal health certificate* issued by the *Competent Authority* of the *exporting country* or a *certifying official* approved by the *importing country*.

This certificate must certify, on the basis of an official mollusc health *surveillance* scheme comprising inspection and laboratory tests on susceptible host species conducted according to the procedures described in the *Manual,* whether or not the place of harvest of the consignment is a country officially declared [perkinsosis] Dermo infection free.

If the place of harvest of the consignment is not a country officially declared [perkinsosis] Dermo infection free, the certificate must state whether the place of harvest of the consignment is:

1. a zone officially declared [perkinsosis] Dermo infection free, or

2. an *aquaculture establishment* officially declared [perkinsosis] Dermo infection free.

The *certificate* shall be in accordance with Model Certificate No. 3 given in Part 6 of this *Code*.

[Article 3.1.5.7.

Importing countries that are officially declared perkinsosis free should only accept for importation live *molluscs* from *exporting countries* declared perkinsosis free, or from clearly defined perkinsosis free zones in countries not declared perkinsosis free.

Importing countries not regarded as perkinsosis free, but that have officially recognised perkinsosis free zones, should only import *molluscs* into such zones from other countries or zones that are officially declared perkinsosis free.

For *aquaculture establishments* officially declared perkinsosis free that exist in infected zones, the *Competent Authority* of the country concerned should only allow importation of *molluscs* from officially declared perkinsosis free countries, zones or *aquaculture establishments*.]

Article 3.1.8.7.

Competent Authorities of *importing countries* should require:

for *molluscs* of commercial size destined for human consumption

the presentation of an *international aquatic animal health certificate* attesting that the *molluscs* [listed as perkinsosis susceptible host species] have as their place of harvest a country, a zone or an *aquaculture establishment* free from [perkinsosis] Dermo infection.

The certificate shall be in accordance with Model Certificate No. 3.

This certificate may not be required for *molluscs* [listed as susceptible host species] originating from an infected zone if they are destined:

1. directly for human consumption without any re-immersion, or

2. for storage, during a short period before consumption, in a tank located in an infected zone. The tank should be isolated from the local environment (e.g. in quarantine) to avoid the potential introduction of different strains of the pathogen.

Article 3.1.8.9.

[Certificates are optional for *molluscs* not listed as natural or experimental perkinsosis susceptible host species] This certificate may not be required for mollusc species that have been demonstrated not to be vectors of *Perkinsus marinus*, even if the *molluscs* originate from an infected country, zone or *aquaculture establishment*.

CHAPTER 3.1.9.

PERKINSUS OLSENI/ATLANTICUS INFECTION [PERKINSOSIS]

([*Perkinsus marinus*,] *Perkinsus olseni/atlanticus*)

Article 3.1.9.1.

The present chapter refers only to [perkinsosis] *Perkinsus olseni/atlanticus* infection when caused by [the *disease agents* listed below in the susceptible host species indicated for each pathogen] *Perkinsus olseni/atlanticus*.

For the purposes of this *Code*, susceptible host species for [*Perkinsus marinus* are: *Crassostrea virginica* and *C. gigas*, and susceptible host species for] *Perkinsus olseni/atlanticus* are: abalones and clam species, among which clinical signs and disease are mainly observed in: *Haliotis ruber*, *H. cyclobates*, *H. scalaris*, *H. laevigata*, *Ruditapes philippinarum* and *R. decussatus*. Many other species may become diseased under certain circumstances.

[Some 50 other species of *molluscs* may harbour *Perkinsus* species that are apparently non-pathogenic.]

Standards for diagnostic tests are described in the *Manual*.

Article 3.1.9.2.

[Perkinsosis] *Perkinsus olseni/atlanticus* infection free country

A country may be considered free from [perkinsosis] *Perkinsus olseni/atlanticus* infection when:

1. no *outbreak* caused by [the *disease agents* listed in Article 3.1.9.1] *Perkinsus olseni/atlanticus* has occurred within its *territory* for at least the previous two years;

2. no [*disease agent* listed in Article 3.1.9.1] *Perkinsus olseni/atlanticus* has been detected in any *mollusc* tested during operation of an official mollusc health *surveillance* scheme for a period of at least two years using the procedures described in the *Manual*.

Article 3.1.9.3.

[Perkinsosis] *Perkinsus olseni/atlanticus* infection free zone

A zone may be considered free from [perkinsosis] *Perkinsus olseni/atlanticus* infection when:

1. no *outbreak* caused by [the *disease agents* listed in Article 3.1.9.1] *Perkinsus olseni/atlanticus* has occurred within its territory for at least the previous two years;

2. no [*disease agent* listed in Article 3.1.9.1] *Perkinsus olseni/atlanticus* has been detected in any *mollusc* tested during operation of an official mollusc health *surveillance* scheme for a period of at least two years using the procedures described in the *Manual* (where a zone common to several countries is involved, these countries should implement harmonised and co-ordinated national disease *surveillance* programmes).

Article 3.1.9.4.

[Perkinsosis] *Perkinsus olseni/atlanticus* infection free aquaculture establishment

A [perkinsosis] *Perkinsus olseni/atlanticus* infection free *aquaculture establishment* may be located within a [perkinsosis] *Perkinsus olseni/atlanticus* infection free country or zone or within a [perkinsosis] *Perkinsus olseni/atlanticus* infection infected zone provided that:

1. it has been tested in an official mollusc health *surveillance* scheme for at least the previous two years using the procedures described in the *Manual*, without detection of [any of the *disease agents* listed in Article 3.1.9.1] *Perkinsus olseni/atlanticus*, and

2. it is supplied with water by a means that ensures removal or destruction of any [of the *disease agents* listed in Article 3.1.9.1] *Perkinsus olseni/atlanticus* that may be present.

Article 3.1.9.5.

Restoration of free status

A country, a zone or an *aquaculture establishment* may be restored to [perkinsosis] *Perkinsus olseni/atlanticus* infection free status if no [*disease agent* listed in Article 3.1.9.1] *Perkinsus olseni/atlanticus* has been detected for the last two years of a *surveillance* scheme using the procedures described in the *Manual.*

Article 3.1.9.6.

When importing live *molluscs* of all age groups [of any susceptible host species] for re-immersion, the *Competent Authority* of the *importing country* should require that the consignment be accompanied by an *international aquatic animal health certificate* issued by the *Competent Authority* of the *exporting country* or a *certifying official* approved by the *importing country*.

This certificate must certify, on the basis of an official mollusc health *surveillance* scheme comprising inspection and laboratory tests on susceptible host species conducted according to the procedures described in the *Manual*, whether or not the place of harvest of the consignment is a country officially declared [perkinsosis] *Perkinsus olseni/atlanticus* infection free.

If the place of harvest of the consignment is not a country officially declared [perkinsosis] *Perkinsus olseni/atlanticus* infection free, the certificate must state whether the place of harvest of the consignment is:

1. a zone officially declared [perkinsosis] *Perkinsus olseni/atlanticus* infection free, or

2. an *aquaculture establishment* officially declared [perkinsosis] *Perkinsus olseni/atlanticus* infection free.

The *certificate* shall be in accordance with Model Certificate No. 3 given in Part 6 of this *Code*.

[Article 3.1.5.7.

Importing countries that are officially declared perkinsosis free should only accept for importation live *molluscs* from *exporting countries* declared perkinsosis free, or from clearly defined perkinsosis free zones in countries not declared perkinsosis free.

Importing countries not regarded as perkinsosis free, but that have officially recognised perkinsosis free zones, should only import *molluscs* into such zones from other countries or zones that are officially declared perkinsosis free.

For *aquaculture establishments* officially declared perkinsosis free that exist in infected zones, the *Competent Authority* of the country concerned should only allow importation of *molluscs* from officially declared perkinsosis free countries, zones or *aquaculture establishments*.]

Article 3.1.9.7.

Competent Authorities of *importing countries* should require:

for *molluscs* of commercial size destined for human consumption

the presentation of an *international aquatic animal health certificate* attesting that the *molluscs* [listed as perkinsosis susceptible host species] have as their place of harvest a country, a zone or an *aquaculture establishment* free from [perkinsosis] *Perkinsus olseni/atlanticus* infection.

The certificate shall be in accordance with Model Certificate No. 3.

This certificate may not be required for *molluscs* [listed as susceptible host species] originating from an infected zone if they are destined:

1. directly for human consumption without any re-immersion, or

2. for storage, during a short period before consumption, in a tank located in an infected zone. The tank should be isolated from the local environment (e.g. in quarantine) to avoid the potential introduction of different strains of the pathogen.

Article 3.1.9.9.

[Certificates are optional for *molluscs* not listed as natural or experimental perkinsosis susceptible host species] This certificate may not be required for mollusc species that have been demonstrated not to be vectors of *Perkinsus olseni/atlanticus*, even if the *molluscs* originate from an infected country, zone or *aquaculture establishment.*

Appendix XI

LIST OF DISEASES NOTIFIABLE TO THE OIE AND OTHER SIGNIFICANT DISEASES

Article 1.1.2.1.

Diseases notifiable to the OIE

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2. Diseases of molluscs

[Bonamiosis] Haemocytosis of flat oysters (*Bonamia ostreae* [, *Bonamia exitiosus, Mikrocytos roughleyi*)]

[Bonamiosis] Haemocytosis of dredge oysters ([*Bonamia ostreae,*] *Bonamia exitiosus* [, *Mikrocytos roughleyi*])

[Bonamiosis] Winter mortality ([*Bonamia ostreae, Bonamia exitiosus,*]) *Mikrocytos roughleyi*)

[Mikrocytosis] Denman Island disease (*Mikrocytos mackini*)

MSX disease *(Haplosporidium nelsoni)*

[Marteiliosis] Aber disease (*Marteilia refringens* [, *M. sydneyi*])

[Marteiliosis] QX disease ([*Marteilia refringens,*] *Marteilia sydneyi*)

[Perkinsosis] Dermo disease (*Perkinsus marinus* [, *P. olseni/atlanticus*])

[Perkinsosis] *Perkinsus olseni/atlanticus* infection ([*Perkinsus marinus,*] (*Perkinsus olseni/atlanticus*)

...

Article 1.1.2.2.

Other significant diseases

...

2. Diseases of molluscs

SSO disease *(Haplosporidium costale)*

Withering syndrome of abalones (*Candidatus* Xenohaliotis californiensis)